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Research Article

Rubus semiplenus (Rosaceae), a new species with naturally occurring semi-double flowers from Hunan, China

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Abstract

The semi-double (*semiplenus*) floral trait is highly valued in the field of horticulture, yet it remains exceptionally rare in wild plants. *Rubus semiplenus*, a new species with naturally occurring semi-double flowers, is described and illustrated. This new species was discovered in the Nanyue Hengshan National Nature Reserve, Hunan Province, China. It is distinguished by its herbaceous to dwarf subshrub habit, simple suborbicular leaves (0.7–2.5 × 0.7–2.5 cm), and semi-double flowers with dicyclic petals (10–12). Molecular phylogenetic analyses based on ITS and *rbc*L + *mat*K sequences consistently confirmed that *R. semiplenus* belongs to Sect. *Rosaefolii* as defined by Focke and is closed to *R. hirsutus*.

Key words: Endemism, Hengshan Mountains, morphology, phylogeny, Section *Rosaefolii*, taxonomy

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Introduction

Rubus L. is one of the largest genera in the Rosaceae family, belonging to the tribe Rubeae of subfamily Rosoideae (Yu and Lu 1985; Lu and Boufford 2003; Potter et al. 2007). This genus is found on all continents except Antarctica, with its primary distribution in East Asia and North America (Thompson 1995, 1997), and contains approximately 750–1000 species worldwide (Yu and Lu 1985; Jennings 1988). *Rubus* is one of the most taxonomically challenging genera of angiosperms (Wang et al. 2016; Okada et al. 2020; Gao et al. 2023; Huang et al. 2023). Species within this genus are typically shrubs, subshrubs, or perennial creeping herbs. Their leaves can be either compound or simple, and flowers are generally bisexual, although unisexual flowers occur rarely; fruits are fleshy aggregates of drupelets (Yu and Lu 1985; Kalkman 1993; Naruhashi 2001; Lu and Boufford 2003). Plants of *Rubus* have significant value in terms of food, medicine, ecology, and economy (Chen and Wang 2006; Foster et al. 2019).

* These authors contributed equally to this work.

The latest global revision of the genus *Rubus* was published nearly a century ago by Focke (1910, 1911, 1914), in which he divided the genus into twelve subgenera. In this classification, the majority of species were placed in *R.* subg. *Rubus* (= *Eubatus*), *R.* subg. *Malachobatus* (Focke) Focke, and *R.* subg. *Idaeobatus* (Focke) Focke. Focke's subgeneric classification has been widely accepted and applied (Nakai 1918; Bailey 1941–1945; Naruhashi 2001). However, modern molecular systematics have not fully supported Focke's classification (Alice and Campbell 1999; Yang and Pak 2006; Yang et al. 2012; Wang et al. 2016). More recently, Huang et al. (2023) proposed a new subgeneric classification system for *Rubus*, based on molecular phylogenetic analysis and morphological data, which divides the genus into 10 subgenera.

China has a rich diversity of *Rubus*, particularly in the southwestern region (Lu 1983; Gu et al. 2000; Lu and Boufford 2003). The first comprehensive revision of the genus *Rubus* in China was conducted by Yu and Lu (1985) for the "Flora Reipublicae Popularis Sinicae", in which 194 species were recognized and classified into 8 sections and 24 subsections. Later, Lu and Boufford (2003) reviewed the Chinese species in the "Flora of China", recognizing 208 species in China, with 139 of them being endemic. In recent years, numerous new species have been continuously discovered and published in China (e.g. Wang and Wang 2019; Wang et al. 2019; Wang et al. 2022; Chen et al. 2024a, 2024b), highlighting the need for continued investigation and study of *Rubus* diversity in China.

During a recent botanical expedition in Nanyue Hengshan National Nature Reserve, Hunan Province, China, we discovered an unknown species of *Rubus* characterized by its herbaceous to dwarf subshrub habit, simple leaves and semi-double flowers. Intrigued by its unique characteristics, we undertook a thorough examination of its morphological traits and performed phylogenetic analyses. The results of these studies clearly supported that this plant is a previously undescribed species.

Materials and methods

Morphological analyses

Morphological investigations were conducted in accordance with standard protocols for plant taxonomic surveys and herbarium-based classification (Davis and Heywood 1963). Specimen dissection and morphological examinations were performed at the laboratory in Yunnan University. A comprehensive list of morphological features was analyzed, including leaf shape (length, width), petiole length, stipule length, flower structure (size, number of petals, stamen count), fruit dimensions, seed morphology, and other distinctive vegetative and reproductive structures. These features were studied under a stereomicroscope (Olympus SZX2, Tokyo, Japan), and measurements were made using a ruler or a micrometer. Digital images available at the JSTOR Global Plants (http://plants.jstor.org/) and the Chinese Virtual Herbarium (https://www.cvh.ac.cn/), as well as relevant collections housed at CDBI, KUN, PE, PYU and YUKU (acronyms according to Thiers 2022), were examined and compared with the new species. Pertinent taxonomic literature (e.g. Focke 1910, 1911, 1914; Yu and Lu 1985; Lu and Boufford 2003; Wang et al. 2016; Wang et al. 2019) was extensively consulted.

Phylogenetic study

To determine the phylogenetic position of the new species, ITS and two plastid genes (*rbc*L and *mat*K) were used as molecular markers. Total genomic DNA was extracted from silica-gel dried leaves of this new species using the DNA-secure Plant Kit (TIANGEN, Beijing, China).

The ITS primers used were ITS4 and ITS5, as detailed by White et al. (1990), and the PCR protocols were conducted according to Wang et al. (2016). Bidirectional sequencing was performed using an ABI 3730xL DNA Analyzer (Applied Biosystems) at the Kunming Branch of Beijing Qingke Biotechnology Co., Ltd. (Yunnan, China).

The new species was sequenced using the genome skimming technique (Straub et al. 2012; Zeng et al. 2018). DNA library construction and paired-end sequencing were completed by Novogene Bioinformatics Technology Co., Ltd. (Tianjin, China), with sequencing performed on the Illumina NovaSeq 6000 platform, generating approximately 3 Gbp of data. The chloroplast genomes (plastomes) were assembled from the clean data using GetOrganelle (Jin et al. 2020), and annotated the plastomes using GeSeq (Plastid Genome Annotator) (Tillich et al. 2017), followed by manual verification in Geneious (Kearse et al. 2012). Finally, the *mat*k and *rbc*L gene sequences were extracted separately from the assembled complete chloroplast genome (GenBank: PV590107) using Geneious.

A total of 65 ITS sequence datasets were obtained in this study, including a new ITS sequence of *R. semiplenus*, 60 *Rubus* sequences and four outgroup sequences obtained from GenBank (Appendix 1: Table A1). In addition, 54 *rbc*L and *mat*K sequences were downloaded from GenBank (Appendix 1: Table A2). Sequences were aligned using MAFFT (Katoh and Standley 2013). The combined dataset of *rbc*L + *mat*K was generated using the Connected Sequence plugin in PhyloSuite (Zhang et al. 2020). The sequences and accession numbers used in this study are detailed in Appendix 1.

Phylogenetic analyses were performed using Maximum Likelihood (ML) methods. The gap sites were removed using trimAl (Capella-Gutiérrez et al. 2009). To determine the nucleotide substitution models for the dataset, we used ModelFinder (Kalyaanamoorthy et al. 2017) to evaluate multiple nucleotide substitution models based on Bayesian Information Criterion (BIC) and selected the best-fit model. ML analysis was then performed using IQ-tree (Nguyen et al. 2015) with 1000 bootstrap replicates. The resulting phylogenetic tree was visualized using iTOL (Letunic and Bork 2021).

Taxonomy

Rubus semiplenus **Huan C. Wang, Ming Hong Li & T. T. Wang, sp. nov.**
urn:lsid:ipni.org:names:77362791-1
Figs 1, 2

Type. China • Hunan Province: Nanyue Hengshan National Nature Reserve, Hengyang City, 20 April 2022, *M. H. Li et al. HY16383* (holotype: YUKU [YUKU02074893]!; isotypes: YUKU [YUKU02074894, YUKU02074895, YUKU02074896]!.)

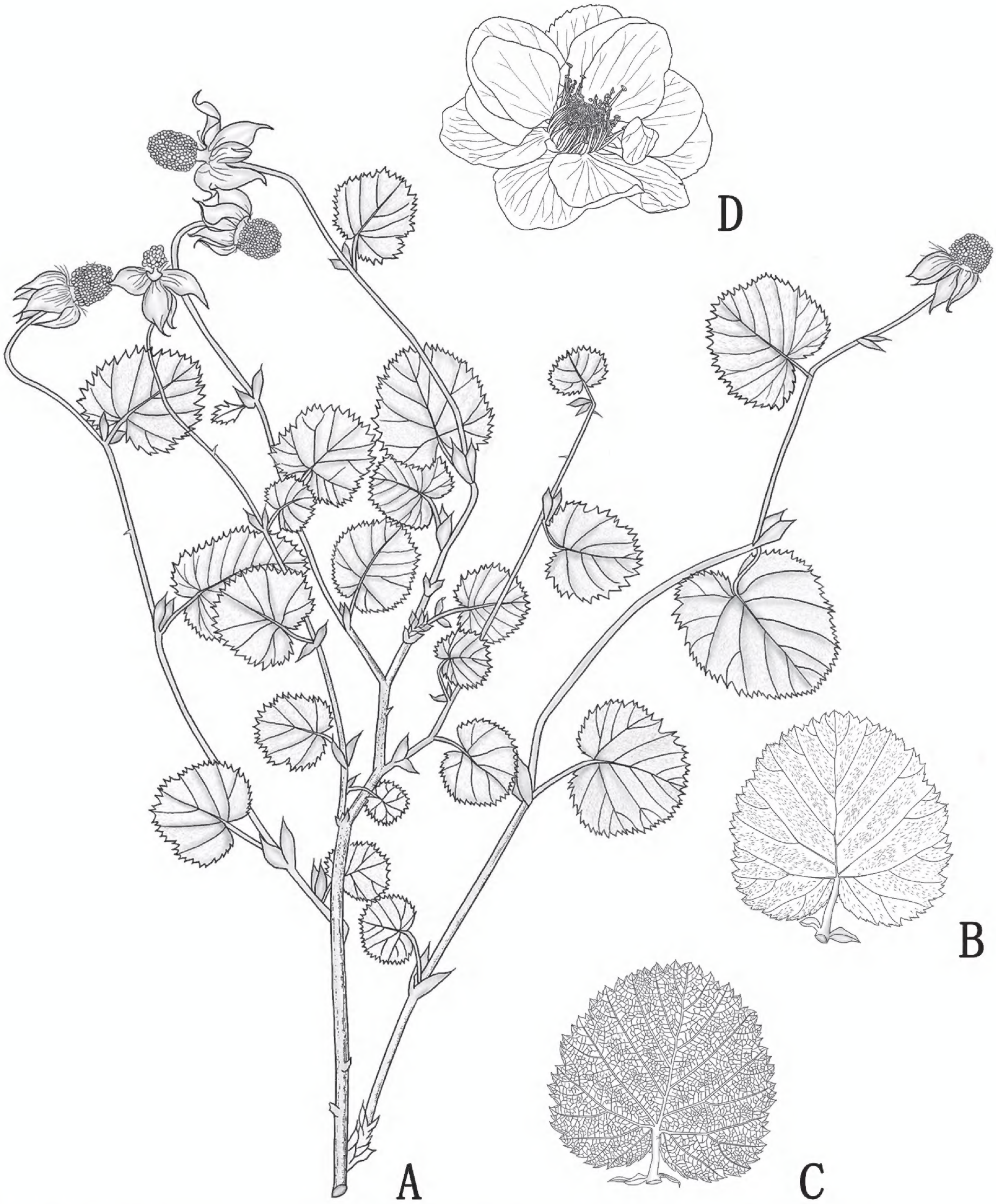

Figure 1. *Rubus semiplenus* sp. nov. **A** habit **B** adaxial surface of leaf **C** abaxial surface of leaf **D** flower.

Diagnosis. *Rubus semiplenus* is most closely related to *Rubus hirsutus* Thunb., but clearly distinguished morphologically from the latter by its habit herbs or dwarf subshrubs (vs. shrubs in *R. hirsutus*), stems villous hairs (vs. soft and glandular hairs), leaves simple (vs. imparipinnate, 3–5 foliolate), suborbicular (vs. ovate or broadly ovate), sepals ovate-orbicular (vs. ovate-lanceolate or triangular-lanceolate), petals dicyclic, semi-doubled flowers, with 10–12 (vs. petals 5).

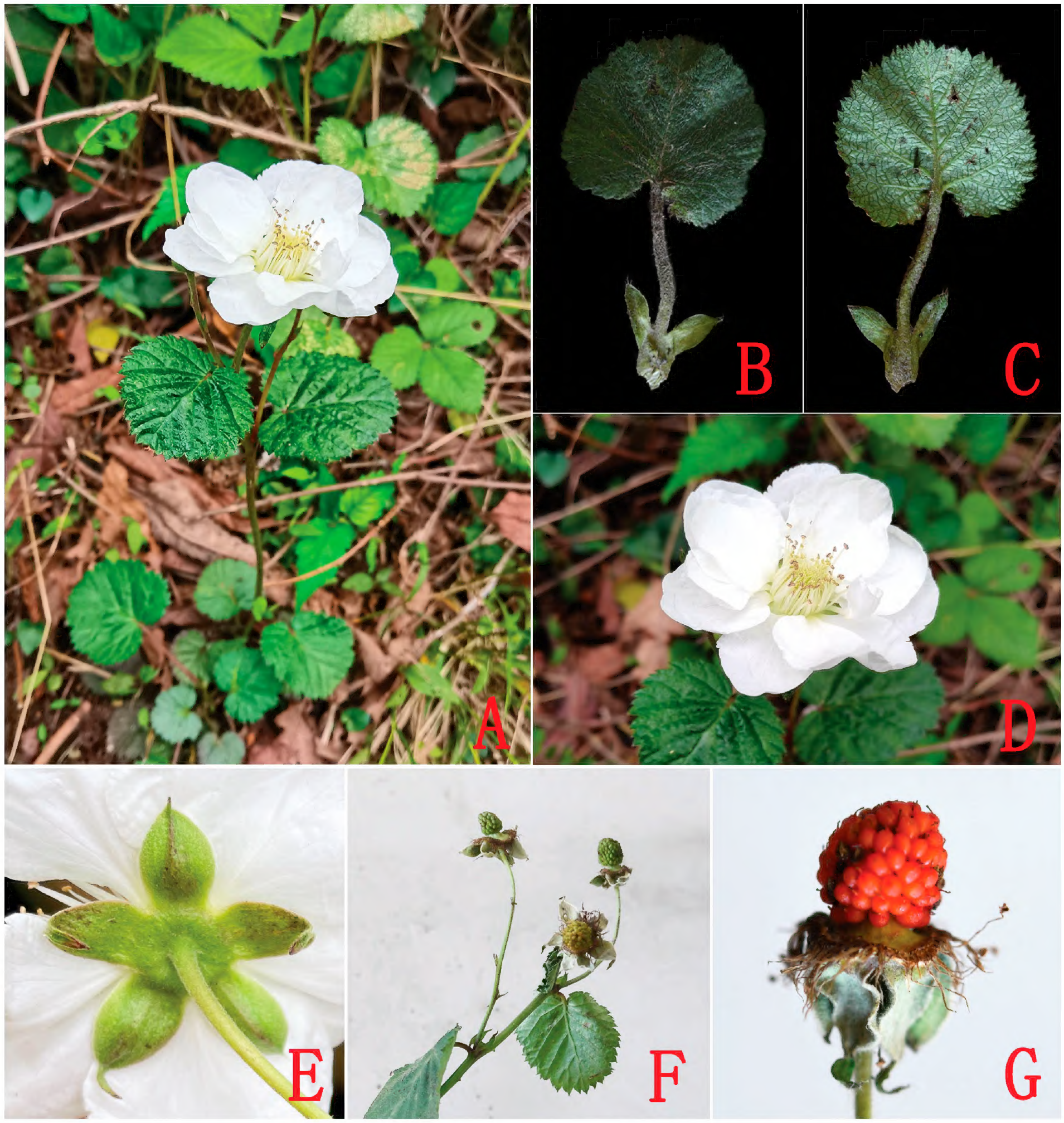

Figure 2. *Rubus semiplenus* sp. nov. **A** habit **B** adaxial surface of leaf **C** abaxial surface of leaf **D** flower **E** calyx **F** infructescence **G** fruit.

Description. Herbs or dwarf subshrubs, 15–20 cm in height. Stem erect, terete, and branched. Branches and branchlets green, sparsely pilose and with minute prickles. Leaves simple. Stipules persistent, adnate to base of petiole, oblong-lanceolate, pilose, entire, 0.4–0.8 (–1.0) cm long, 0.1–0.3 cm wide, apex acuminate. Petiole 0.3–2.0 cm long, pilose. Leaf blade suborbicular, 0.7–2.5 cm long, 0.7–2.5 cm wide, both surfaces pilose, lateral veins 5 pairs, base cordate, margin doubly serrate, apex rounded. Inflorescences terminal, 2–3 flowers forming a corymb; bracts oblong-lanceolate, pilose, apex acuminate. Pedicel 3.0–4.5 cm long, densely pubescent. Flowers 2.0–3.5 cm in diameter; calyx light green, pubescent or tomentose abaxially, densely tomentose adaxially; sepals 5,

ovate-orbicular, 0.5–1.0 (–1.2) cm long, 0.4–0.6 cm wide, entire, apex acuminate to caudate, spreading at anthesis, reflexed in fruit; petals semi-doubled, white, dicyclic, 10–12, ovate-orbicular or broadly ovate, longer than calyx, base shortly clawed; stamens straight, numerous, glabrous; filaments linear; pistils numerous, ca. 70–100, shorter than stamens; ovary villous at base. Aggregate fruit orange-red, subglobose, 0.5–0.7 cm in diameter, glabrous or sparsely pubescent.

Molecular phylogenetics. The ITS, *rbc*L, and *mat*K sequence lengths of *Rubus semiplenus* are 699 bp, 1428 bp, and 1512 bp, respectively, with GC contents of 54.1%, 43.0%, and 32.5%. Sequence alignment of the ITS dataset includes 65 sequences with 604 bp, among which 182 are parsimony-informative sites and 77 are singleton sites. The plastid (*rbc*L + *mat*K) dataset consists of 2078 aligned positions, including 125 parsimony-informative sites and 158 singleton sites. According to the Bayesian Information Criterion (BIC), the best-fit models for the ITS and *rbc*L + *mat*K datasets are TNe+R3 and K3Pu+F+R2, respectively. The phylogenetic trees constructed using ITS and plastid (*rbc*L + *mat*K) sequences are largely congruent in topology. In the ITS phylogenetic tree (Fig. 3), the genus *Rubus* was clearly resolved into eight clades, which largely correspond to the subgenera delineated by Huang et al. (2023). *Rubus semiplenus* nests within clade E, representing subgenus *Batothamnus* (Focke) E. H. L. Krause, and belongs to a well-supported subclade I (BS = 99), which includes *R. tsangii* Merr., *R. hirsutus* Thunb., *R. croceacanthus* H. Lév., *R. rosifolius* Sm., *R. sumatranus* Miq and *R. leucanthus* Hance. Notably, except for *R. leucanthus*, the remaining five species in this subclade belong to the Sect. *Rosaefolii* as defined by Focke (1910–1914). Similar to the ITS phylogenetic tree results, in the *rbc*L + *mat*K phylogenetic tree (Fig. 4), *R. semiplenus* falls within clade D1, also representing the subgenus *Batothamnus*, and clusters with *R. hirsutus*, *R. rosifolius*, *R. illecebrosus* Focke, *R. croceacanthus* to form subclade G1 with full support (BS = 100). All species in subclade G1 belong to Focke's Sect. *Rosaefolii*. Additionally, *R. semiplenus* is resolved as sister to *R. hirsutus* with moderate support (BS = 83).

Phenology. Flowering from March to April, Fruiting from May to June.

Etymology. The specific epithet "*semiplenus*" is derived from the Greek words "*semi*" (meaning half) and "*plenus*" (meaning double), which refer to this new species with semi-double flowers.

Habitat and distribution. *Rubus semiplenus* is known only from the type locality in Nanyue Hengshan National Nature Reserve, Hengyang City, Hunan Province, China. This nature reserve belongs to a subtropical monsoon humid climate and includes many Chinese National Key Protected Plants, such as *Ginkgo biloba* L., *Taxus wallichiana* var. *mairei* (Lemée & H. Lév.) L. K. Fu & Nan Li, and *Bretschneidera sinensis* Hemsl. The new species mainly grows under the shrubs at an altitude of 800–900 meters.

Discussion

The trait of doubled or semi-doubled flowers is highly valued in horticulture for its aesthetic appeal and ornamental potential, yet it remains exceptionally rare in wild plants. Within the Rosaceae, this trait is commonly observed in many cultivated species across several genera, including *Prunus* L. and *Rosa* L. (Yang et al. 2024). However, it is exceedingly rare in the genus *Rubus*. Prior to this

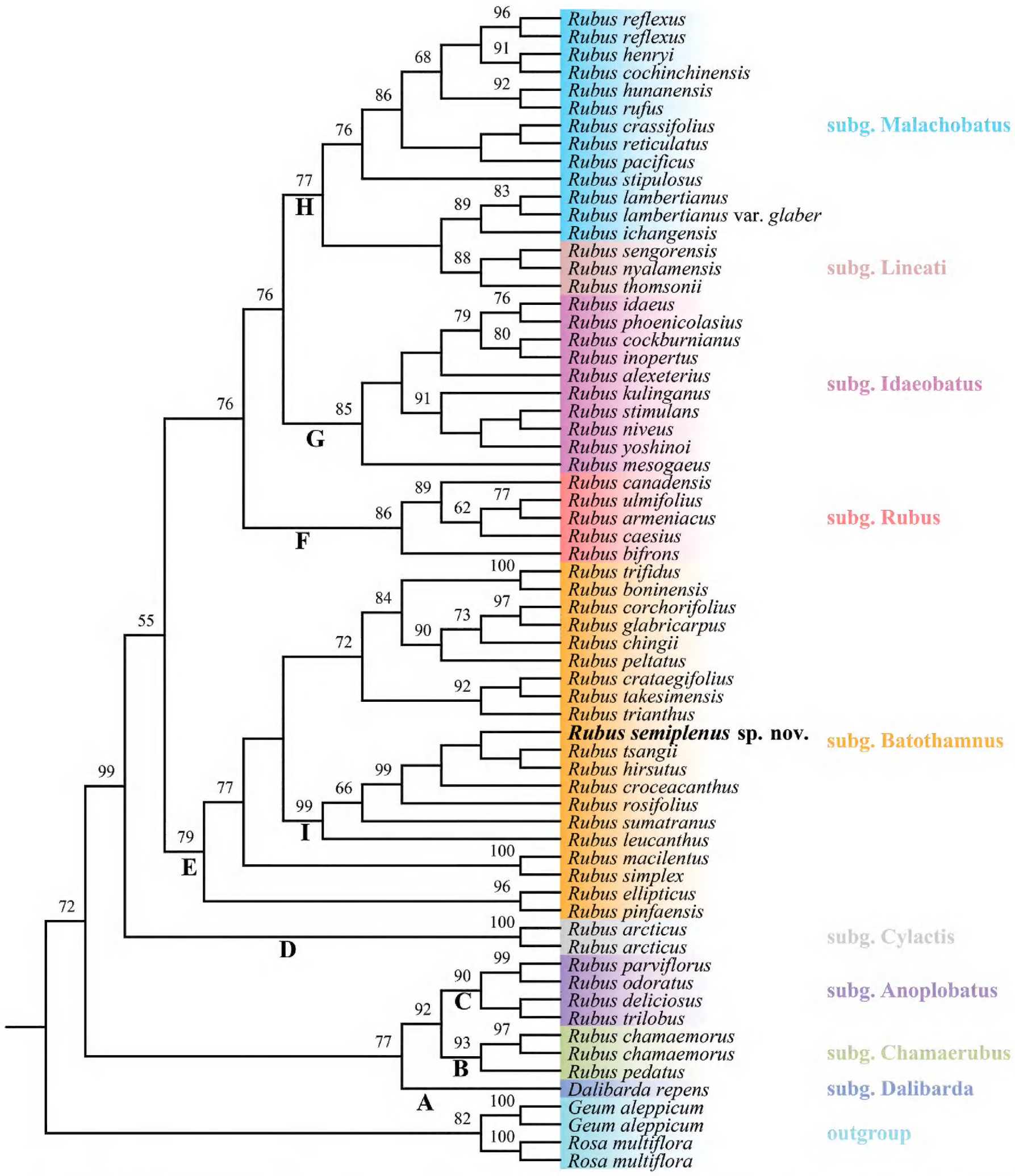

Figure 3. Maximum likelihood phylogenetic tree of *Rubus* based on ITS sequences, illustrating the phylogenetic placement of *R. semiplenus*. Bootstrap values are shown above branches. *R. semiplenus* is highlighted in bold face. Subgeneric names are listed on the right, with different subgenera represented by different colors. Subgeneric names and classifications follow the taxonomy proposed by Huang et al. (2023).

study, only a few species, such as *Rubus rosifolius* var. *coronarius* (Sims) Focke, along with a limited number of cultivated varieties, were known to exhibit this characteristic (Mao et al. 2012). Given its rarity, the discovery of *Rubus semiplenus* is of significant botanical and horticultural value.

Compared to the typical shrub habit, species with subshrub or herbaceous habits are relatively rare in genus *Rubus* (Yu and Lu 1985). However, the emergence of subshrub habits may be the result of convergent evolution, as these

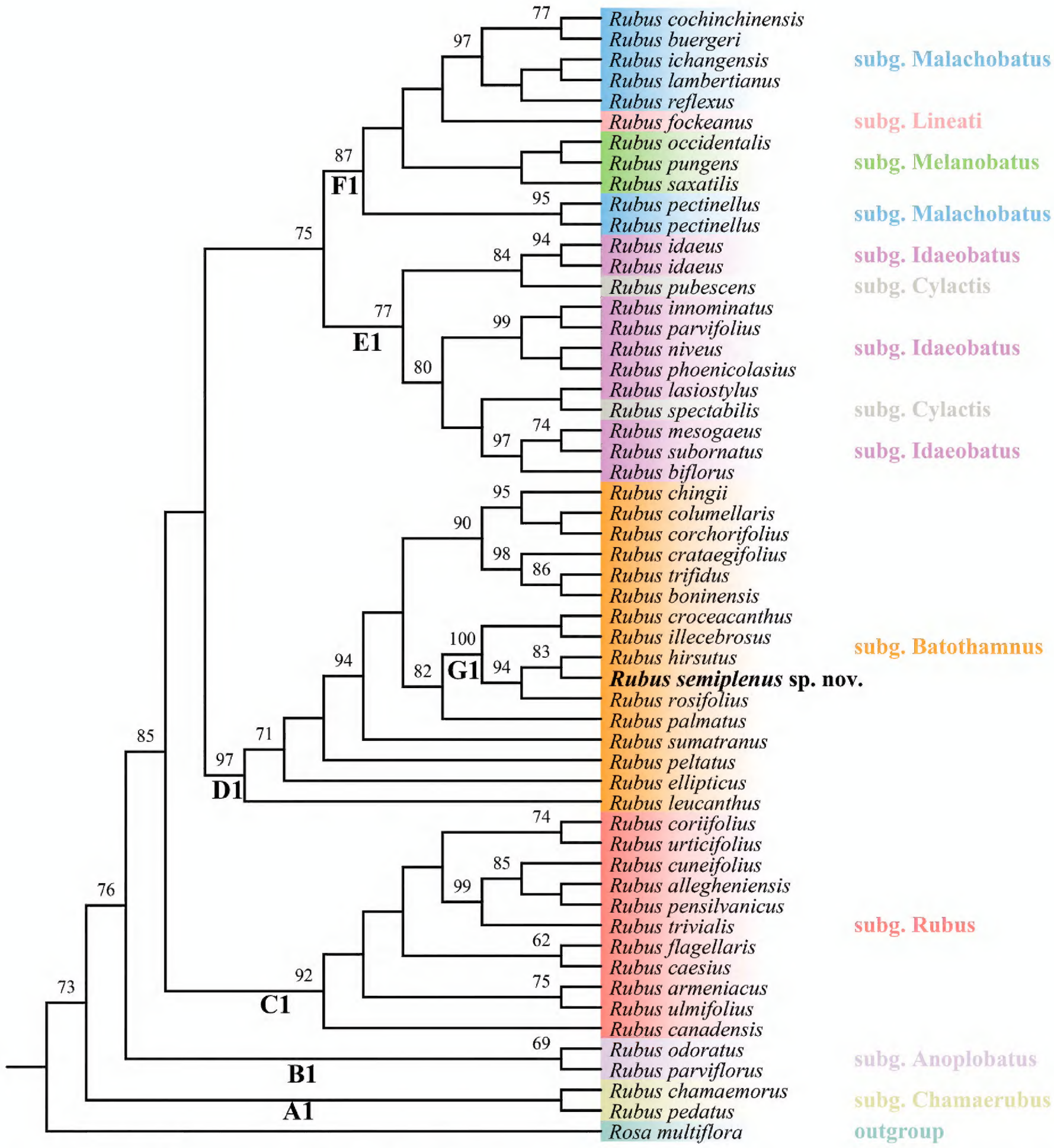

Figure 4. Maximum Likelihood tree of *Rubus* based on *rbc*L+*mat*K gene sequences illustrating the phylogenetic placement of *R. semiplenus*. Bootstrap values are shown above branches. *R. semiplenus* is highlighted in bold face. Subgeneric names are listed on the right, with different subgenera represented by different colors. Subgeneric names and classifications follow the taxonomy proposed by Huang et al. (2023).

species often appear in different evolutionary lineages. In China, about 40 species of *Rubus* have been recorded as subshrubs or herbaceous types (Yu and Lu 1985; Lu and Boufford 2003). According to the latest subgeneric classification by Huang et al. (2023), most of the subshrub or herbaceous species belong to the Subg. *Lineati* (Focke) T.R.Huang & X.Y.Zhu, such as *R. fockeanus* Kurz and *R. metoensis* T. T. Yu & L. T. Lu. Species within this subgenus are mostly adapted to high altitude or high latitude habitats. Morphologically, the new species should be classified into Subg. *Batothamnus* (Focke) E.H.L.Krause (Huang et al. 2023). Within Subg. *Batothamnus*, there are also some subshrub-type

Rubus species, such as *R. delavayi* Franch., *R. impressinervus* F. P. Metcalf and *R. simplex* Focke. Nevertheless these taxa belong to different sections and have significant taxonomic differences from the new species. Molecular analyses demonstrate that although the new species clusters within the same major clade as *R. leucanthus* Hance and *R. simplex* Focke (Figs 3, 4; Clade E, Clade D1), marked discontinuities in both phylogenetic relationships and morphological characteristics are observed.

Phylogenetic analyses based on ITS and *rbc*L + *mat*K sequences consistently indicate that the new species belongs to *Rubus* subg. *Batothamnus* (Focke) E.H.L. Krause. Moreover, *R. semiplenus* should be classified within Focke's Sect. *Rosaefolii*. This result is not only supported by molecular results, but also aligns with its morphological characteristics, which are typical of species in this section, such as numerous carpels and white flowers. However, all previously known species in this section are shrubs with compound leaves. In contrast, *R. semiplenus* is unique, being the only species in this section with simple leaves and semi-double flowers, further distinguishing it from other members of the group.

Molecular analyses indicate that the new species is most closely related to *R. hirsutus*. However, it can be readily distinguished from *R. hirsutus* by several characteristics. The new species is a herb or dwarf subshrub, whereas *R. hirsutus* is a shrub. Its stems are villous, compared to the soft and glandular hairs of *R. hirsutus*. The leaves are simple, whereas *R. hirsutus* has imparipinnate leaves with 3–5 leaflets. The leaf blades are suborbicular, whereas those of *R. hirsutus* are ovate to broadly ovate. The petals are arranged in two cycles, with 10–12 petals, in contrast to the five petals of *R. hirsutus*. Additionally, the fruits are glabrous or sparsely pubescent, whereas those of *R. hirsutus* are entirely glabrous.

Additional specimens examined

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Author contributions

Conceptualization: HCW. Data curation: DYK. Investigation: XJL, DYK. Methodology: QPW. Resources: QPW. Writing - original draft: TTW, MHL, HCW. Writing - review and editing: HCW.

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Data availability

All of the data that support the findings of this study are available in the main text.

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Appendix 1

Table A1. ITS sequences information downloaded from the GenBank.

No.	Species	GenBank
1	*Dalibarda repens* L.	AF055748
2	*Geum aleppicum* Jacq.	KF873777
3	*Geum aleppicum* Jacq.	OR699355
4	*Rosa multiflora* Thunb.	KP966598
5	*Rosa multiflora* Thunb.	MK533408
6	*Rubus alexeterius* Focke	EF034119
7	*Rubus arcticus* L.	AF055741
8	*Rubus arcticus* L.	EF034120
9	*Rubus armeniacus* Focke	OL899237
10	*Rubus bifrons* Vest	KM037669
11	*Rubus boninensis* Koidz.	LC624385
12	*Rubus caesius* L.	KU294729
13	*Rubus canadensis* L.	AF055777
14	*Rubus chamaemorus* L.	AF055740
15	*Rubus chamaemorus* L.	U90803
16	*Rubus chingii* Hu	LC624375
17	*Rubus cochinchinensis* Tratt.	OP340989
18	*Rubus cockburnianus* Hemsl.	KU881070
19	*Rubus corchorifolius* L.	KP093158
20	*Rubus crassifolius* T. T. Yu & L. T. Lu	KU881076
21	*Rubus crataegifolius* Bunge	AF055754
22	*Rubus croceacanthus* H. Lév.	LC624288
23	*Rubus deliciosus* Torr.	AF055733
24	*Rubus ellipticus* Sm.	EF034124
25	*Rubus glabricarpus* W. C. Cheng	KU881090
26	*Rubus henryi* Hemsl. & Kuntze	KU881091
27	*Rubus hirsutus* Thunb.	LC515691
28	*Rubus hunanensis* Hand.-Mazz.	KU881093
29	*Rubus ichangensis* Hemsl. & Kuntze	EF034128
30	*Rubus idaeus* L.	AF055755
31	*Rubus inopertus* (Focke) Focke	KU881107
32	*Rubus kulinganus* L. H. Bailey	KU881111
33	*Rubus lambertianus* Ser.	AF055796
34	*Rubus lambertianus* var. *glaber* Hemsl.	KU881114
35	*Rubus leucanthus* Hance	KP093160
36	*Rubus macilentus* Cambess.	EF034136
37	*Rubus mesogaeus* Focke ex Diels	LC515690
38	*Rubus niveus* Wall. ex G. Don	MZ206307
39	*Rubus nyalamensis* T. T. Yu & L. T. Lu	KU881127
40	*Rubus odoratus* L.	KM037685
41	*Rubus pacificus* Hance	KU881128
42	*Rubus parviflorus* Nutt.	EF050804
43	*Rubus pedatus* Sm.	LC624387
44	*Rubus peltatus* Maxim.	LC515683
45	*Rubus phoenicolasius* Maxim.	AF055759

No.	Species	GenBank
46	*Rubus pinfaensis* H. Lév. & Vaniot	KU881148
47	*Rubus reflexus* Ker Gawl.	KP093165
48	*Rubus reflexus* Ker Gawl.	KP093166
49	*Rubus reticulatus* Wall. ex Hook. f.	KU881158
50	*Rubus rosifolius* Sm.	KP093168
51	*Rubus rufus* Focke	KU881162
52	*Rubus sengorensis* Grierson & D.G.Long	EF034141
53	*Rubus semiplenus* Huan C. Wang, Ming Hong Li & T. T. Wang	PV596324
54	*Rubus simplex* Focke	KU881169
55	*Rubus stimulans* Focke	KU881172
56	*Rubus stipulosus* T. T. Yu & L. T. Lu	KU881173
57	*Rubus sumatranus* Miq.	LC515688
58	*Rubus takesimensis* Nakai	AY818216
59	*Rubus thomsonii* Focke	EF034145
60	*Rubus trianthus* Focke	AY083366
61	*Rubus trifidus* Steud.	AF055737
62	*Rubus trilobus* Ser.	AF055738
63	*Rubus tsangii* Merr.	KU881190
64	*Rubus ulmifolius* Schott	KM037610
65	*Rubus yoshinoi* Koidz.	LC624345

Table A2. *rbc*L, *mat*K gene sequences information downloaded from the GenBank.

No.	Species	*rbc*L	*mat*K
1	*Rosa multiflora* Thunb.	LC662004	LC662012
2	*Rubus allegheniensis* Porter	MK526532	MK520547
3	*Rubus armeniacus* Focke	KX678957	KX677516
4	*Rubus biflorus* Buch.-Ham. ex Sm.	MN192849	MN492833
5	*Rubus boninensis* Koidz.	LC624541	LC624475
6	*Rubus buergeri* Miq.	LC624530	LC624464
7	*Rubus caesius* L.	JN892997	JN895641
8	*Rubus canadensis* L.	KY427303	KY427300
9	*Rubus chamaemorus* L.	LC624523	LC624457
10	*Rubus chingii* Hu	LC624531	LC624465
11	*Rubus cochinchinensis* Tratt.	GU363824	GU363786
12	*Rubus columellaris* Tutcher	KP094935	KP093990
13	*Rubus corchorifolius* L.	LC797503	LC797488
14	*Rubus coriifolius* Liebm.	OP711219	OQ289878
15	*Rubus crataegifolius* Bunge	MZ128512	MZ128648
16	*Rubus croceacanthus* H. Lév.	LC515896	LC515924
17	*Rubus cuneifolius* Pursh	ON341340	ON341187
18	*Rubus ellipticus* Sm.	MK157064	MK157063
19	*Rubus flagellaris* Willd.	KP643972	KP643060
20	*Rubus fockeanus* Kurz	MH116377	MH116826
21	*Rubus hirsutus* Thunb.	LC629708	LC629702
22	*Rubus ichangensis* Hemsl. & Kuntze	MN192853	MN492835
23	*Rubus idaeus* L.	LC624542	LC624476
24	*Rubus idaeus* L.	LC629709	LC629703

No.	Species	*rbc*L	*mat*K
25	*Rubus illecebrosus* Focke	MZ128496	MZ128630
26	*Rubus innominatus* S. Moore	MN205247	MN492837
27	*Rubus lambertianus* Ser.	LC624532	LC624466
28	*Rubus lasiostylus* Focke	MH657789	MH659334
29	*Rubus leucanthus* Hance	KP094382	KP093463
30	*Rubus mesogaeus* Focke ex Diels	MN205248	MN492838
31	*Rubus niveus* Wall. ex G. Don	MK157050	MK157049
32	*Rubus occidentalis* H. Lév.	LC515877	LC515905
33	*Rubus odoratus* L.	MF349716	MF349835
34	*Rubus palmatus* Hemsl.	LC624560	LC624494
35	*Rubus parviflorus* Nutt.	MK526550	MK520559
36	*Rubus parvifolius* Nutt.	MN205250	MN492841
37	*Rubus pectinellus* Maxim.	LC624529	LC624463
38	*Rubus pectinellus* Maxim.	MZ128501	MZ128636
39	*Rubus pedatus* Sm.	LC624543	LC624477
40	*Rubus peltatus* Maxim.	MZ128447	MZ128566
41	*Rubus pensilvanicus* Poir.	KP643958	KP643050
42	*Rubus phoenicolasius* Maxim.	MZ128485	MZ128617
43	*Rubus pubescens* Raf.	MG249679	MG221118
44	*Rubus pungens* Cambess.	LC624547	LC624481
45	*Rubus reflexus* Ker Gawl.	KP094770	KP093831
46	*Rubus rosifolius* Sm.	MN192857	MN451028
47	*Rubus saxatilis* L.	MK925451	MK926261
48	*Rubus semiplenus* Huan C. Wang, Ming Hong Li & T. T. Wang	PV600993	PV600992
49	*Rubus spectabilis* Pursh	LC515898	LC515926
50	*Rubus subornatus* Focke	MH116380	MH116829
51	*Rubus sumatranus* Miq.	LC515888	LC515916
52	*Rubus trifidus* Steud.	MZ128464	MZ128649
53	*Rubus trivialis* Michx.	OL434824	OL434947
54	*Rubus ulmifolius* Schott	HM850315	HM850696
55	*Rubus urticifolius* Poir.	JQ593603	JQ588899